AF/1714

Attorney Docket: 132/42381C2
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: LAWRENCE R. GRZYLL ET AL.

Serial No.: 09/500,919 Group Art Unit: 1714

Filed: FEBRUARY 9, 2000 Examiner: J. ANTHONY

Title: FIRE EXTINGUISHING METHODS AND BLENDS UTILIZING UNSATURATED PERFLUOROCARBONS

FILING OF NEW APPEAL BRIEF IN RESPONSE TO NOTICE OF NON-COMPLIANCE

Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants submit that the following complete new Appeal Brief as required by the Notification of Non-Compliance dated October 10, 2001, thereby satisfying the requirements of 37 C.F.R. §1.192(c). Entry and consideration of the Appeal Brief are respectfully requested.

Respectfully submitted,

November 13, 2001

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#17/Bm
11/16/01

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Title: FIRE EXTINGUISHING METHODS AND BLENDS UTILIZING UNSATURATED PERFLUOROCARBONS

APPEAL BRIEF
AND
REQUEST FOR CONSOLIDATION OF PENDING APPEAL

Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants respectfully request that the present appeal be consolidated with the appeal pending in related application U.S. Serial No. 08/895,687 in order to obviate duplicative consideration by the Board and expense to Applicants.

I. INTRODUCTION

This Appeal is from a final Office Action mailed March 5, 2001, rejecting Claims 27-32. No claims are allowed.

A. REAL PARTY IN INTEREST

The real party in interest for this Appeal is Mainstream Engineering Corporation.

B. RELATED APPEALS AND INTERFERENCES

Applicants request that this appeal be consolidated with the appeal pending in related application U.S. Serial No. 08/895,687.

C. STATUS OF CLAIMS

Claims 27-32 are pending and stand rejected. These claims are set forth in the attached Appendix.

D. STATUS OF AMENDMENTS

An Amendment was filed on November 20, 2000 in which Claims 27 and 32 were amended. If needed, Applicants offer to file a Terminal Disclaimer to overcome the provisional rejection of Claims 27-32 under the doctrine of obviousness-type double patenting upon resolution of the pending appeals.

II. SUMMARY OF THE INVENTION

Halogenated chemical agents containing combinations of fluorine, chlorine, bromine, iodine, and hydrogen are well known. Such chemical agents include Halon 1301 (CF_3Br), Halon 1211 (CF_2ClBr), and Halon 2402 (CF_2BrCF_2Br)(specification at page 1, lines 4-12). However, these fire extinguishing agents are believed to be capable of destroying the ozone layer (specification at page 2, lines 1-2). These agents are also thought to contribute to global warming because their atmospheric lifetime is sufficiently long that they persist in the atmosphere and absorb solar radiation.

The present invention is directed to fire extinguishing methods using a fire extinguishing agent that surprisingly has similar volatility, residue levels, material compatibility and safety characteristics as Halons. More importantly, the fire extinguishing methods of the present invention are environmentally acceptable (specification at page 2, lines 21-26).

The claimed fire extinguishing methods use a mixture of an unsaturated perfluorocarbon, such as octofluoro-2-butene, and at least one additional as a fire extinguishing composition. Because the unsaturated perfluorocarbons contain

no chlorine or bromine, they have zero ozone depletion potential (specification at page 3, lines 5-10).

III. THE APPLIED REFERENCES

The applied references are the same as in related application U.S. Serial No. 08/895,687. The applied references are:

1. Japanese Patent Application 5-42230 (JP '230);

2. Pitts et al., "Construction of an Exploratory List of Chemicals to Initiate the Search for Halon Alternatives";

3. U.S. Patent No. 5,117,917 (Robin); and

4. optionally the Preliminary Amendment and 1.132 Declaration filed on February 10, 1998.

A. JP '230

JP '230 discloses fire extinguishing agents that contain at least one of (1) a chain-form or branch-form saturated halogenated hydrocarbon with 1-4 carbon atoms replaced with fluorine and/or chlorine; (2) a cyclic saturated halogenated hydrocarbon with 3-4 carbon atoms and replaced with fluorine; and (3) a chain-form or branch-form unsaturated carbon fluoride with 3-4 carbon atoms and a double bond (translated numbered paragraph [0009]).

JP '230 does not disclose octafluoro-2-butene. The only unsaturated carbon fluoride disclosed is hexafluoropropene (i.e., $CF_3CF=CF_2$). See paragraph [0013]. JP '230 also states that the disclosed fire extinguishing agents do not destroy the ozone layer, unlike agents containing bromine. See paragraphs [0002]-[0004].

B. Pitts

Pitts details the results of a literature search on combustion suppression, flame inhibition and fire retardancy and identifies nine chemical families with the potential for workbench testing. One of the nine families is unsaturated halocarbons (page 54).

With respect to unsaturated halocarbons, Pitts indicates that the presence of a double bond and a bromine atom may shift the absorption spectrum of a particular compound toward the red and thus give photolysis a chance to destroy the gas before it migrates into the stratosphere (page 54). Pitts further states: "Assuming a special role for bromine in fire suppression, custom synthesis will be necessary to place bromine in a variety of positions and exploit the special effects introduced with the presence of a double bond" (page 54, fourth paragraph, emphasis added).

When referring to the compounds disclosed in Table 7, Pitts indicates that although the first six compounds are commercially available, none contains a bromine group. Thus, "custom synthesis will be necessary to widen the range of possibilities . . . the molecules which have been added to Table 7 will be particularly interesting" (page 55). Because many of the compounds listed in Table 7 are toxic, unsaturated blood substitute analogs such as 1,2-bis(perfluoromethyl)ethylene and tetris(perfluoromethyl)-ethylene are presented as possible non-toxic alternatives.

C. Robin

Robin discloses that completely fluorinated, saturated C_2, C_3 and C_4 compounds are non-ozone-depleting fire extinguishing agents used alone or in blends with other compounds in total flooding and portable systems (Abstract). Robin does not disclose any unsaturated fluorocarbons, much less octafluoro-2-butene.

D. Preliminary Amendment and Declaration filed on February 10, 1998

In the Declaration attached to the Preliminary Amendment filed on February 10, 1998, Mr. Lawrence Grzyll, a co-Applicant of the present invention, pointed out that the published literature suggests that hexafluoropropene may be toxic and thus not suitable for fire suppression. Sax et al., "Dangerous Properties of Industrial Materials," 7th ed. (1984), assign a hazard rating of 3 to hexafluoropropene compared to a hazard rating of 1 for octafluoro-2-butene. The

4-hour LC_{50} for hexafluoropropene is 1673 (rat). The LC_{10} for octafluoro-2-butene is 6100 ppm (rat). The LC_{50} is higher than the LC_{Lo} by definition. Thus, hexafluoropropene is at least 3.6 times more toxic than octafluoro-2-butene. The Preliminary Amendment and Declaration simply confirm what is disclosed on pages 132-133 of Pitts.

IV. ISSUE ON APPEAL

The issue on appeal is whether a method for extinguishing a fire using a mixture of an unsaturated perfluorocarbon, such as octafluoro-2-butene, and at least one additional fire extinguishing agent is rendered obvious by a combination of references that provide no teaching, suggestion, or motivation to use such a mixture as a fire extinguishing composition.

V. GROUPING OF CLAIMS

Each claim of this patent application is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. 282.

In addition to Groups I-III in the appeal in Serial No. 08/895,687, the pending claims are group as follows for convenience:

Claims 27-29 and 31 (Group IV);

Claim 32 (Group V); and

Claim 30 (Group VI).

Groups IV-VI will be argued separately in the following arguments by representative claims within each group. The groups do not stand or fall together.

VI. ARGUMENT

A. The Cited References In Combination Do Not Teach Or Suggest A Fire Extinguishing Composition Comprising A Mixture Of Octafluoro-2-Butene And At Least One Additional Fire Extinguishing Agent (Group VI)

JP '230, Pitts, and Robin do not teach or suggest a method of extinguishing a fire comprising introducing a fire extinguishing composition comprising a mixture of octafluoro-2-butene and at least one additional fire extinguishing agent, as recited in Claim 30 (Group VI).

JP '230 does not disclose octafluoro-2-butene. Further, although JP '230 generically discloses unsaturated carbon fluorides with 3-4 carbon atoms, one of ordinary skill in the art would have been led to practice saturated carbon fluorides (e.g., $CF_3CF_2CF_3$, octafluorocyclobutane) or hydrofluorocarbons because these compounds are shown in Table 1 to have lower fire extinguishing concentrations (FEC) than hexafluoropropene, the only disclosed unsaturated carbon fluoride.

1. Any Combination of JP '230, Pitts and Robin Would Have Led to the Use of A Non-toxic Blood Substitute or A Saturated Carbon Fluoride

Neither Pitts, Robin, or the Preliminary Amendment and Declaration overcomes the deficiencies of JP '230. Upon review of Pitts, one of ordinary skill in the art would have been led away from using octafluoro-2-butene.

First, Pitts clearly indicates a preference for brominated compounds, which is contrary to the teaching of JP '230. A reference must be considered not only for what it expressly teaches, but also for what it fairly suggests. Second, Pitts teaches that perfluoroisobutene, an isomer of octafluoro-2-butene, is a deadly poison and that consideration should be given to possible conversion to this toxic isomer when studying octafluoro-2-butene (see pages 55 and 133). Pitts and the Preliminary Amendment and Declaration filed on February 10,

1998, merely disclose that octafluoro-2-butene is less toxic than hexafluoropropene.

Because Pitts teaches a preference for brominated compounds and indicates that a poisonous isomer may result from the use of octafluoro-2-butene, one of ordinary skill in the art would not have substituted octafluoro-2-butene for the hexafluoropropene or hexafluoroisobutene disclosed in JP '230 in view of Pitts. Any combination of JP '230 and Pitts would have led one of ordinary skill in the art to substitute non-toxic 1,2-bis(perfluoromethyl)ethylene (i.e., $CF_3CH=CHCF_3$) for the hexafluoropropene or hexafluoroisobutene of JP '230. JP '230 discloses using such unsaturated halogenated hydrocarbons with 3-4 carbon atoms and a double bond replaced with fluorine (translated numbered paragraph [0007]).

Robin does not overcome the deficiencies of JP '230 and Pitts. Robin only discloses saturated, not unsaturated, compounds as fire extinguishing agents. Thus, any combination of JP '230 and Robin would have led one of ordinary skill in the art to use a saturated carbon fluoride. As noted above, JP '230 discloses that saturated carbon fluorides have a lower FEC than hexafluoropropene.

2. "Obvious to Try" is An Incorrect Standard for Determining Obviousness

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In re Geiger, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987) (noting that the standard for §103 is not that one skilled in the art might find it obvious to try various combinations of known scale and corrosion prevention agents). An invention is obvious to try where the prior art gives (1) either no indication of which parameters are critical or (2) no direction as to which of many possible choices is likely to be successful. Merck & Co. Inc. v. Biocraft Laboratories, 10 USPQ2d 1843, 1845 (Fed. Cir. 1989). Pitts merely recommends certain compounds, in particular brominated unsaturated compounds and non-toxic blood substitute analogs, for future study. Pitts does not state that octafluoro-2-butene is usable or has been usable as a fire

extinguishing agent. Although Pitts may pique the scientist's curiosity such that further investigation might be done as a result of the disclosure, Pitts does not contain a sufficient teaching that the claimed result would be obtained if this direction were pursued. In re Eli Lilly & Co., 14 USPQ2d 1741, 1743 (Fed. Cir. 1990).

As noted above, any combination of the cited references would have led one of ordinary skill in the art to use (1) the non-toxic blood substitute analog 1,2-bis(perfluoromethyl)ethylene, or (2) a saturated carbon fluoride as a fire extinguishing agent. Thus, it would not have been obvious for one of ordinary skill in the art to practice a method of extinguishing a fire comprising introducing a fire extinguishing composition comprising a mixture of octafluoro-2-butene and at least one additional fire extinguishing agent, as recited in Claim 30 (Group VI) in view of the combined teachings of the cited references.

B. The Cited References In Combination Do Not Teach Or Suggest A Fire Extinguishing Composition Comprising A Mixture Of Unsaturated Perfluorocarbon And At Least One Additional Fire Extinguishing Agent (Group IV)

As acknowledged by the Examiner, JP '230 does not specifically teach a fire extinguishing composition comprising an admixture of an unsaturated fluorinated carbon with at least one additional fire-extinguishing agent, as recited in Claim 27 (Group IV) (Final Office Action at paragraph bridging pages 4-5). Because JP '230 discloses only one unsaturated perfluorocarbon, i.e. hexafluoropropene, a mixture of this compound with an additional fire extinguishing agents is based upon obvious to try reasoning.

Neither Pitts nor Robin overcomes the deficiencies of JP '230. Like JP '230, Pitts does not teach a fire extinguishing composition comprising a mixture of an unsaturated fluorinated carbon with additional fire-extinguishing agents. Robin only discloses blends with fluorinated saturated C_2, C_3 and C_4 compounds, not unsaturated perfluorocarbons, and chlorinated and/or brominated compounds. Thus, it would not have been obvious for one of ordinary skill in the art to introduce a fire extinguishing composition comprising a mixture of an

unsaturated perfluorocarbon and at least one additional fire extinguishing agent to a fire as recited in Claim 27 (Group IV) in view of the combined teachings of the cited references.

C. The Cited References In Combination Do Not Teach Or Suggest Streaming A Fire Extinguishing Composition Comprising A Mixture Of Unsaturated Perfluorocarbon And At Least One Additional Fire Extinguishing Agent (Group V)

As acknowledged by the Examiner, JP '230 does not teach a streaming step, as recited in Claim 32 (Group V) (Final Office Action at page 5).

Applicants respectfully note that FEC data cannot be used to determine the efficacy of fire extinguishing agents for streaming applications. Cup burner flame-extinguishing concentrations (FEC's) are used to rank agents for total flooding applications. In contrast, minimum application density (flow rate/fire surface area) is used to rank agents for streaming applications. This difference in determining the efficacy for fire extinguishing agents to be used in total flooding and streaming applications is known to those of ordinary skill in the art.

JP '230 discloses that some fire extinguishing agents can contain a gaseous jet agent to promote release of the fire extinguishing agent from a fire extinguisher. However, hexafluoropropene and hexafluoroisobutene are not shown in Tables 2-3. Similarly, although Robin discloses possible streaming applications, Robin only discloses FEC data in Tables 1-2. Further, the only example of using the perfluorocarbons disclosed in Robin is in a total flooding system, as shown in Example 3.

Because none of the cited references teaches or suggests steaming a fire extinguishing composition comprising a mixture of an unsaturated perfluorocarbon and at least one additional fire extinguishing agent to a fire, Claim 32 (Group V) would not have been obvious in view of the combined teachings of the cited references.

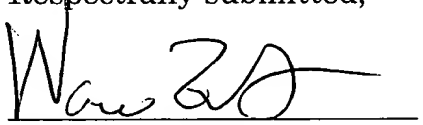
VII. CONCLUSION

For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejection of Claims 27-32.

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 05-1323 (Docket #132/42381C2). A triplicate copy of this Appeal Brief is attached).

Respectfully submitted,

November 13, 2001



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APPENDIX

27. A method of extinguishing a fire, comprising:

introducing a fire extinguishing composition comprising a mixture of an unsaturated perfluorocarbon and at least one additional fire extinguishing agent to the fire; and

maintaining a concentration of the fire extinguishing composition sufficient to extinguish the fire,

wherein said unsaturated perfluorocarbon has the formula C_xF_y, wherein x is 3 or 4 and y is 6 or 8.

28. A method according to claim 27, wherein said unsaturated perfluorocarbon is selected from the group consisting of hexafluoropropene, octafluoro-1-butene, and octafluoro-2-butene.

29. A method according to claim 27, wherein said additional fire extinguishing agent is selected from the group consisting of CF_3CFHCF_3, CF_3CF_2H, $CF_3CHFCHF_2$ and $CF_3CH_2CF_3$.

30. A method of extinguishing a fire, comprising introducing a fire extinguishing composition comprising a mixture of octafluoro-2-butene and at least one additional fire extinguishing agent to the fire; and

maintaining a concentration of the fire extinguishing composition sufficient to extinguish the fire.

31. A method according to claim 27, wherein said additional fire extinguishing agent is a gas.

32. A method according to claim 27, wherein the step of introducing comprises streaming.